

DIAGNOSTIC MEDICINE

COURSE DESCRIPTION

Diagnostic Medicine creates a picture of an individual's health status at a single point in time. This could include following careers and career areas: audiologist, cardiology, imaging, medical laboratory, radiography, nuclear medicine, stereotactic radiosurgery, cytotechnology, clinical laboratory technician, pathologists, medical physician, histotechnologist.

It is strongly recommended that administration and guidance follow the scope and sequence and course recommendations as listed.

Recommended Credits: 1

Recommended Grade Level(s): 10-12th

Number of Competencies in Course: 48

INTEGRATION/LINKAGES

Math, Physical Science, Chemistry, Biology, National Science Standards, Language Arts, Social Studies, Computer Skills, SCANS, National Health Care Skills Standards, National Language Arts Standards, HOSA Guidelines, Industry Skills

DIAGNOSTIC MEDICINE

- 1.0** The students will apply various communication methods to give, obtain, and transmit information and evaluate the use of electronic media in the delivery of health care in the clinical setting.
- 2.0** The student will be aware of the existing and potential hazards to clients, co-workers, and self; the prevention of injury or illness through safe work practices; and adherence to health and safety policies and procedures.
- 3.0** Students will apply knowledge of diagnostic radiology, select appropriate equipment, and identify basic anatomy on the resulting images.
- 4.0** The student will identify careers and skills in cardiac status evaluation and monitoring.
- 5.0** The student will investigate all aspects of careers related to a medical laboratory; then, collect, label, and process artificial samples of body fluids and tissues for laboratory assessment; and analyze results.
- 6.0** Students will interpret an optical prescription, select the equipment, and initiate the procedure for obtaining corrective lenses.
- 7.0** The student will perform classroom laboratory activities and apply knowledge and skills in a health care diagnostic clinical setting and/or classroom.

DIAGNOSTIC MEDICINE

STANDARD 1.0

The students will apply various communication methods to give, obtain, and transmit information and evaluate the use of electronic media in the delivery of health care in the clinical setting.

LEARNING EXPECTATIONS

The student will:

- 1.1 Incorporate verbal and non-verbal communication skills into explaining various diagnostic procedures to persons with disabilities, cultural differences, and multiple age differences.
- 1.2 Investigate methods for sharing diagnostic procedures electronically.
- 1.3 Put into practice the use of technology to deliver medical images and obtain results of diagnostic tests.
- 1.4 Analyze data received via tele-health.
- 1.5 Interpret diagnostic principles and technology to deliver health care via tele-health.
- 1.6 Investigate multiple facility guidelines and legal issues related to sharing health care information.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student will:

- 1.1 Communicate effectively both orally and in writing, validating the patient history, comforting the client, eliciting cooperation by the client, and recording results to the electronic patient record.
- 1.2 Demonstrate client/patient care based on physical status and psycho-social aspect of client needs through the use of role-playing.
- 1.3 Demonstrate the use of technology, using appropriate computers/videophone to deliver patient information.
- 1.4 Successfully transmit via electronic source diagnostic test information to a mock health care facility.
- 1.5 Analyze data received via tele-health or other electronic methods and explain the finding in a mock clinic situation.
- 1.6 Relate principles and technology requirements for delivery of health care via tele-health method.
- 1.7 Identify guidelines related to electronic transmission of medical record information related to diagnostic testing.

SAMPLE PERFORMANCE TASK

- Role-play situations with persons who have cultural barriers, language barriers, physical or mental barriers that are also receiving diagnostic tests.
- Search Internet for pictures of radiological images and EKG images; create laboratory test results and other diagnostic results to practice transmitting electronically.
- Develop a mock doctor's office or clinic to transmit diagnostic test results to.
- Research tele-health and various methods used in health care community today.
- Create a notebook with input from class on required guidelines related to electronic transmission of medical records.

DIAGNOSTIC MEDICINE

STANDARD 2.0

The student will be aware of the existing and potential hazards to clients, co-workers, and self; prevention of injury or illness through safe work practices; and adherence to health and safety policies and procedures.

LEARNING EXPECTATIONS

The student will:

- 2.1 Demonstrate the use of Standard Precautions and OSHA Standards to prevent the spread of infection.
- 2.2 Differentiate between all available methods to prevent and/or contain fire and electrical hazard.
- 2.3 Identify equipment and materials safely in the diagnostic areas.
- 2.4 Research safety standards for health care professionals and patients related to radiological procedures.
- 2.5 Formulate a safety plan for a medical laboratory
- 2.6 Perform routine quality testing on any diagnostic equipment either in the classroom laboratory or in a clinical setting.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student will:

- 2.1 Demonstrate concepts of standard precautions by correctly performing hand washing skills, personal protective equipment donning, and waste disposal.
- 2.2 Demonstrate proper use of fire extinguishers and recognize situations that are potential fire and electrical hazards.
- 2.3 Label and Identify equipment using pictures or the actual equipment.
- 2.4 Evaluate the area of diagnostics in which each piece of equipment could be found.
- 2.5 Perform routine inspection of equipment that is used in diagnostic service areas.
- 2.6 Construct a safety plan for the radiological department.
- 2.7 Construct a safety plan for the medical laboratory department.
- 2.8 Inspect any diagnostic equipment prior to use on patient to maintain quality reporting of diagnostic results.

SAMPLE PERFORMANCE TASK

- Students will practice hand washing skills, donning all items of personal protective equipment, and biohazard material disposal.
- Invite someone from fire department to visit classroom to instruct on the use of fire extinguishers, then, allow students to demonstrate use.
- Using Extemporaneous Health Poster guidelines, have students construct an educational poster on health care facility fire safety in one of the areas of diagnostic medicine.
- Inventory and organize all equipment according to diagnostic area.
- Students will research safety guidelines for radiological area in a health care facility, then, develop a safety plan. Compare their safety plans with one from local health care facility.
- Students will research safety guidelines for medical laboratory area in a health care facility, then, develop a safety plan. Compare their safety plans with one from local health care facility.
- Practice performing quality control on an inexpensive over-the-counter glucose machine and any other diagnostic equipment you have in the classroom lab.

DIAGNOSTIC MEDICINE

STANDARD 3.0

Students will apply knowledge of diagnostic radiology, select appropriate equipment, and identify basic anatomy on the resulting images.

LEARNING EXPECTATIONS

The student will:

- 3.1 Compare and contrast the roles and academic requirements to practice in the diagnostic areas of radiography, nuclear medicine, digital mammography, and ultrasonography.
- 3.2 Research history of radiology and related diagnostic areas.
- 3.3 Differentiate the theories behind X-ray, magnetic resonance imaging (MRI), positive emission tomography (PET), ultrasound, digital imaging, and nuclear medicine.
- 3.4 Investigate and create guidelines related to radiation protection for patient and imaging personnel.
- 3.5 Critique diagnostic images for quality as well as normal and abnormal findings.
- 3.6 Review anatomy and physiology as it related to radiological procedures.
- 3.7 Interpret anatomy on a multitude of medical images ranging from X-ray, MRI, PET, and nuclear medicine.
- 3.8 Identify anatomical positions, body planes, and cavities as they relate to imaging.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student will:

- 3.1 Organize information obtained from research related to diagnostic imaging health careers into writing assignment with a thesis statement in the introduction, well-constructed paragraphs, a conclusion, and transition sentences that connect paragraphs into a coherent whole.
- 3.2 Construct a time line related to the history of diagnostic imaging careers.
- 3.3 Identify research questions related to the theories of various areas of diagnostic imaging health careers.
- 3.4 Research Internet for radiation protection guidelines or read health care facility manuals to create a guideline book for your high school if you had diagnostic imaging equipment.
- 3.5 View medical radiological images to determine quality of image with suggestions on how to improve them.
- 3.6 Identify anatomy on various radiological images.
- 3.7 View or utilize Internet to find medical radiology links and/or links to medical images and relate these to human anatomy.

3.8 Properly position a patient for multiple radiological images.

SAMPLE PERFORMANCE TASK

- Role-play careers that are in a medical imaging department.
- Utilize National HOSA Prepared Speaking skills guidelines and rubric to develop and present a 3-5 minute speech on a diagnostic imaging health career.
- Calculate and apply ratios, proportions, rates, and percentages related to salaries of diagnostic imaging health careers. Calculate gross pay, percentage of federal taxes that are withheld, average cost of benefits, to determine net take-home pay.
- Use math skills to calculate half-life of radioisotopes used in nuclear medicine.
- Job shadow or take field trip to imaging centers; using industry professional in the classroom, describe the imaging chain and process.
- Design a Venn diagram to contrast and compare film and video radiography, computed tomography, magnet resonance imaging, nuclear medicine, and ultra-sonography.
- Role-play a procedure and evaluate images for anatomy on each.

DIAGNOSTIC MEDICINE

STANDARD 4.0

The student will identify careers and skills in cardiac status evaluation and monitoring.

LEARNING EXPECTATIONS

The student will:

- 4.1 Compare the educational requirements, certification, and licensures for cardiovascular technologist, diagnostic vascular technologist, electrocardiogram technician, telemetry technician, cardiac sonographers, and other related cardiovascular careers.
- 4.2 Investigate cardiac diagnostic procedures both in-hospital and out-patient and identify required equipment.
- 4.3 Compare and identify gross heart anatomy and physiology and related cardiac conduction and circulatory pathways.
- 4.4 Assess lead placements and correlate their relationship to the conduction system.
- 4.5 Analyze four and twelve lead rhythm strips and differentiate between critical and non-critical sinus, atria, junctional, supraventricular, heart block, bundle branch block, and ventricular dysrhythmias.
- 4.6 Explain dysrhythmias in relation to causes, pre-disposing factors, and treatment using appropriate medical terminology.
- 4.7 Assess and analyze cardiac output and tissue perfusion using a capillary refill and/or pulse oximeter.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student will:

- 4.1 Develop a work-related memo, e-mail or correspondence teaching a new administrator about a career in the cardiovascular area. Include relevant information about the career to thoroughly inform the administrator who is new to health care.
- 4.2 Research cardiac diagnostic procedures and write a patient teaching information sheet.
- 4.3 Sketch a heart indicating the conduction pathway related to a heartbeat.
- 4.4 Apply leads for EKG correctly either on a mannequin, a person, or a drawing.
- 4.5 Analyze telemetry strips., correctly identifying as normal and abnormal and type of rhythm.
- 4.6 Construct a chart of critical and non-critical dysrhythmia with explanation for each.
- 4.7 Perform capillary refill using fellow students for skill assessment.

SAMPLE PERFORMANCE TASK

- Develop a marketing plan to add at least two of the cardiovascular positions to your department, physician's office, outpatient center or other health care facility.
- Obtain sample telemetry strips and EKG's. Practice analyzing and categorizing them. Do this as teams and evaluate each other's results. Samples can be obtained from local health care facilities or the Internet.
- Sketch and identify gross anatomy and physiology of heart.

DIAGNOSTIC MEDICINE

STANDARD 5.0

The student will investigate all aspects of careers related to a medical laboratory, then, collect, label, and process artificial samples of body fluids and tissues for laboratory assessment and analyze results.

LEARNING EXPECTATIONS

The student will:

- 5.1 Compare the diagnostic roles of medical technology, clinical laboratory sciences, and subspecialties, including settings for employment.
- 5.2 Relate OSHA standards and Standard Precautions in a medical laboratory setting.
- 5.3 Identify the multiple components of blood including types of blood cells, functions of cells, and blood groups
- 5.4 Demonstrate the steps in obtaining and labeling venous, capillary, and arterial blood samples for diagnostics testing.
- 5.5 Simulate specimen collection and processing for various procedures.
- 5.6 Collect, measure, and test artificial samples of simulated body fluids using reagent strips and gross analysis.
- 5.7 Relate laboratory data to specific disease processes using related terminology.
- 5.8 Connect ordered laboratory blood test with correct collection tube.
- 5.9 Interpret normal and abnormal lab values that are most often ordered in a physician's office.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student will

- 5.1 Prepare a visual display explaining careers related to the medical laboratory in a hospital, free standing labs, and clinics.
- 5.2 Categorize clinical laboratory departments and subspecialties within departments.
- 5.3 Score 100% on OSHA test.
- 5.4 Construct a model of one of the many blood cells and explain function.
- 5.5 Obtain and label body fluid and tissue samples for laboratory test.
- 5.6 Analyze specimen collection procedures and apply critical thinking skills to prevent obtaining incorrect specimens.
- 5.7 Follow a blood sample from physician's order, through collection, labeling, processing, and reporting process.
- 5.8 Evaluate results of test using medical clinical guidelines.
- 5.9 Analyze the consequences of patient receiving incorrect blood during transfusion,

SAMPLE PERFORMANCE TASK

- Utilize National HOSA Career Health Display guidelines have students choose a career area in the Medical Laboratory setting and prepare a display.
- Develop a brochure, web site or wiki explaining the various clinical laboratory departments in your facility.
- Practice hand washing, gowning and gloving as related to the medical laboratory.
- Practice drawing venous blood from a mannequin's arm.
- Using over-the-counter kits, evaluate artificial body fluids and specimens.

DIAGNOSTIC MEDICINE

STANDARD 6.0

Students will interpret an optical prescription, select the equipment, and initiate the procedure for obtaining corrective lenses.

LEARNING EXPECTATIONS

The student will:

- 6.1** Differentiate between normal and abnormal anatomy of the eye.
- 6.2** Analyze equipment used in the optical lab to diagnose diseases of the eye.
- 6.3** Formulate an appropriate eye wear product and complete the order form for a client according to facility guidelines.
- 6.4** Observe a lensometer to obtain a prescription for validation and quality control.
- 6.5** Assess post-prescription vision and give instructions for care of eyewear product.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student will:

- 6.1** Illustrate normal and abnormal anatomy of the eye.
- 6.2** Demonstrate the use of optical equipment, such as lensometer, topography, funds photography, auto refractory, visual field, and horopito.
- 6.3** Analyze a sample prescription for contact lenses and glasses.
- 6.4** Select the appropriate lenses and frame for a client.
- 6.5** Instruct client on care of glasses or contact lens

SAMPLE PERFORMANCE TASKS

- Construct a 3-D model of the interior and exterior eye.
- Go on field trip to optometrist's office to practice using equipment if possible.
- Have an optometrist visit classroom to share equipment and allow students to practice skills.
- Obtain optical prescriptions from an ophthalmologist and an optometrist and convert from one format to another, compare results.
- Research frames online to choose the best for a client according to their face and complexion.

DIAGNOSTIC MEDICINE

STANDARD 7.0

The student will perform classroom laboratory activities and apply knowledge and skills in a health care diagnostic clinical setting and/or classroom.

LEARNING EXPECTATIONS

The student will:

- 7.1 Design or create a procedure using technical writing skills.
- 7.2 Read, interpret, verbalize, and apply policies and procedures appropriate to the health care setting.
- 7.3 Participate in a health care facility orientation prior to clinical experience.
- 7.4 Demonstrate the use of pertinent safety precautions and aseptic techniques.
- 7.5 Utilize proper communication, critical thinking, and problem-solving techniques.
- 7.6 Demonstrate the safe and appropriate use of equipment and supplies.
- 7.7 Perform skills safely and effectively as outlined in policy and procedures of the health care facility and standards of the health care profession.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student will:

- 7.1 Perform activities efficiently and without injury to patients or self.
- 7.2 Convey pertinent information to patient and appropriate team members within a timely manner.
- 7.3 Prepare a checklist observing team members using aseptic techniques.
- 7.4 Evaluate student response to written scenario documenting communication.
- 7.5 Illustrate scenario by using Creative Problem Solving Guidelines Research.
- 7.6 Research equipment guidelines for proper use in a diagnostic lab.
- 7.7 Illustrate equipment usage by using Health Poster guidelines.
- 7.8 Demonstrate diagnostic skills following facility policies and procedures.

SAMPLE PERFORMANCE TASK

- Complete skills check-off list in classroom laboratory that are pertinent to the diagnostic careers.
- Using diagnostic policies and procedures, read and interpret protocol guidelines.
- Research 21st Century diagnostic equipment; compare cost and usage to present equipment.